

# Prepare Offline Infrastructure from the scratch

AES

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# 1 Docker Installation for RHEL 7.9

## 1.1 (Virtual) Machine Requirements

CPU: 16

RAM: 32 GB

Root disk space: 20GB

External disk space (XFS format) : 100G

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## 1.2 Docker Setup

Docker has two type of distributions, the commercial (EE) and the community one (CE). Because RHEL 7.5 is a commercial product, the only distribution included in [RedHat<sup>1</sup>](#) official repositories is the EE.

The following steps describe how to install Docker CE edition in RHEL using the official version provided by Centos.

1. Verify that no previous or other versions of docker are running in the machine

```
yum remove docker \  
    docker-client \  
    docker-client-latest \  
    docker-common \  
    docker-latest \  
    docker-latest-logrotate \  
    docker-logrotate \  
    docker-selinux \  
    docker-engine-selinux \  
    docker-engine
```

2. Install yum-utils package and add the Docker CE yum repo

---

<sup>1</sup> <https://ictwiki.alma.cl/twiki/bin/edit/SoftOps/RedHat?topicparent=SoftOps.RHEL75DockerEnvironment;nowysiywg=0>

```
yum install -y yum-utils nfs-utils
```

3. **Deprecated (Add repo docker and enable the 'extras rpms' repo in RHEL) ==> IT give us with all this ready.**

```
## add docker repo
yum-config-manager \
    --add-repo \
    https://download.docker.com/linux/centos/docker-ce.repo

o

## enable extras rpms
subscription-manager repos --enable=rhel-7-server-extras-rpms
```

4. Install latest docker version

```
yum install -y docker-ce # latest docker version will be installed and
all necessary packages that needs docker-ce

systemctl start docker

systemctl enable docker
```

5. Edit/create the systemctl setup to make possible to docker run

```
## edit /etc/systemd/system/multi-user.target.wants/docker.service
[Service]
ExecStart=
ExecStart=/usr/bin/dockerd

# create /etc/systemd/system/docker.service.d/override.conf
[Service]
ExecStart=
ExecStart=/usr/bin/dockerd

# systemctl daemon-reload

# systemctl restart docker
```

6. Docker has a configuration file in JSON format used to add custom settings to the default installation. In order to make possible the communication between Ansible and Docker Engine we need to enable the Docker API.

This is done first creating the configuration under /etc/docker/daemon.json file and then adding the following settings

```
{
    "hosts": ["tcp://0.0.0.0:2375", "unix:///var/run/docker.sock"]
}
```

- Restart the Docker Engine in order the changes can take effect.

```
service docker restart
```

Docker API can be queried easily using curl:  
Example:

```
curl localhost:2375/info
```

```
{ "ID": "GS77:42HG:UGSH:DHOL:JZ7Z:3UUD:OBRV:UMWV:IYRV:K4SV:QIGW:4JBB", "Containers": 1, "ContainersRunning": 0, "ContainersPaused": 0, "ContainersStopped": 1, "Images": 1, "Driver": "overlay2", "DriverStatus": [ [ "Backing Filesystem", "xfs" ], [ "Supports d_type", "true" ], [ "Native Overlay Diff", "true" ] ], "SystemStatus": null, "Plugins": { "Volume": [ "local" ], "Network": [ "bridge", "host", "macvlan", "null", "overlay" ], "Authorization": null, "Log": [ "awslogs", "fluentd", "gcplogs", "gelf", "journald", "json-file", "logentries", "splunk", "syslog" ] }, "MemoryLimit": true, "SwapLimit": true, "KernelMemory": true, "CpuCfsPeriod": true, "CpuCfsQuota": true, "CPUShares": true, "CPUSet": true, "IPv4Forwarding": true, "BridgeNfIptables": true, "BridgeNfIp6tables": true, "Debug": false, "NFD": 20, "OomKillDisable": true, "NGoroutines": 33, "SystemTime": "2018-07-14T18:13:14.589640935-04:00", "LoggingDriver": "json-file", "CgroupDriver": "cgroupfs", "NEventsListener": 0, "KernelVersion": "3.10.0-862.6.3.el7.x86_64", "OperatingSystem": "Red Hat Enterprise Linux", "OSType": "linux", "Architecture": "x86_64", "IndexServerAddress": "https://index.docker.io/v1/", "RegistryConfig": { "AllowNondistributableArtifactsCIDRs": [], "AllowNondistributableArtifactsHostnames": [], "InsecureRegistryCIDRs": [ "127.0.0.0/8" ], "IndexConfigs": { "docker.io": { "Name": "docker.io", "Mirrors": [], "Secure": true, "Official": true } }, "Mirrors": [] }, "NCPU": 16, "MemTotal": 33566322688, "GenericResources": null, "DockerRootDir": "/var/lib/docker", "HttpProxy": "", "HttpsProxy": "", "NoProxy": "", "Name": "v-dkrtst01.sco.alma.cl", "Labels": [], "ExperimentalBuild": false, "ServerVersion": "18.03.1-ce", "ClusterStore": "", "ClusterAdvertise": "", "Runtimes": { "runc": { "path": "docker-runc" } }, "DefaultRuntime": "runc", "Swarm": { "NodeID": "", "NodeAddr": "", "LocalNodeState": "inactive", "ControlAvailable": false, "Error": "", "RemoteManagers": null }, "LiveRestoreEnabled": false, "Isolation": "", "InitBinary": "docker-init", "ContainerdCommit": { "ID": "773c489c9c1b21a6d78b5c538cd395416ec50f88", "Expected": "773c489c9c1b21a6d78b5c538cd395416ec50f88" }, "RuncCommit": { "ID": "4fc53a81fb7c994640722ac585fa9ca548971871", "Expected": "4fc53a81fb7c994640722ac585fa9ca548971871" }, "InitCommit": { "ID": "949e6fa", "Expected": "949e6fa" }, "SecurityOptions": [ "name=seccomp,profile=default" ] }
```

### 1.3 Storage Setup

In production mode Docker needs a special setup to store containers data. Starting in RHEL 7.5, Docker Engine must be configured to use a block device formatted with XFS in conjunction with the overlay2 storage driver to manage containers

- Check if exist /nfs .. if not existe create

```
mkdir /nfs
```

2. Ask IT to add permission to the nfs disk for the new server. You can test it like this:

```
mount -t nfs unity01-nfs05.sco.alma.cl:/incretl /nfs
```

3. Use the blkid command to display the UUID and TYPE for the new file system and make a note of this value.

```
blkid /dev/sdb  
  
output: UUID=e3654938-70c9-4f18-b5c8-e06c0f25dc16
```

4. Add the entry to /etc/fstab

```
unity01-nfs05.sco.alma.cl:/incretl /nfs nfs defaults,_netdev 0 0
```

5. Restart the server and check with df -h

```
df -h|grep nfs  
### if everything is ok, this is the output that you will have  
[root@v-incretl06 ~]# df -h|grep nfs  
unity01-nfs05.sco.alma.cl:/incretl 1.3T 621G 660G 49% /nfs
```

6. Check that everything is ok for the storage with 'docker info'

```
Storage Driver: overlay2  
Backing Filesystem: xfs  
Supports d_type: true  
Native Overlay Diff: true  
Logging Driver: json-file  
Cgroup Driver: cgroupfs
```

## 1.4 Cluster Setup

1. Activate Swarm Mode

```
docker swarm init
```

2. Login to Private Registry

In order to pull ALMA images, the local machine must be registered again the Docker Private registry at JAO.

```
docker login registry.asa.alma.cl
```

Credentials: Username → software

### 3. Install swarm command line helper

```
vim /usr/local/bin/swarm
```

Copy & paste the following block.

```
#!/bin/bash

action=$1
service_name=$2
node_port=2375

if [ -n "$service_name" ] && [ -n "$action" ]; then
    container_name=$(docker service ps --no-trunc $service_name | awk
'FNR==2{print $2"."$1}')
    node_name=$(docker service ps $service_name | awk 'FNR==2{print $4}')
    if [ $action == "exec" ]
    then
        docker -H "$node_name":"$node_port" exec -it "$container_name" /bin/
bash
    elif [ $action == "restart" ]
    then
        docker -H "$node_name":"$node_port" restart "$container_name"
    elif [ $action == "logs" ]
    then
        docker -H "$node_name":"$node_port" logs -f --tail=200
"$container_name"
    elif [ $action == "stats" ]
    then
        docker -H "$node_name":"$node_port" stats "$container_name"
    elif [ $action == "ps" ]
    then
        docker -H "$node_name":"$node_port" ps -a --no-trunc --filter name=^/"$
container_name"$
    elif [ $action == "inspect" ]
    then
        docker -H "$node_name":"$node_port" inspect "$container_name"
    fi
else
    echo "Please provide a service and a docker command name"
fi
```

Change script permissions: `chmod +x /usr/local/bin/swarm`

### 4. Change default value for task retention history limit:

```
docker swarm update --task-history-limit=3
```

5. Setup kernel `max_map_count` variable. (This is required by elasticsearch component of ASAX)

```
vim /etc/sysctl.conf
vm.max_map_count=262144
sysctl --system
sysctl vm.max_map_count
```

6. Setup net-bridge (only to remove some warnings in the docker logs)

```
sysctl net.bridge.bridge-nf-call-iptables=1
sysctl net.bridge.bridge-nf-call-ip6tables=1
```

7. Connect more nodes to the cluster  
Retrieve the connector token from swarm.

```
docker swarm join-token worker
```

Access to the new node and run the command displayed in the previous step.

#### Example

```
docker swarm join --token SWMTKN-1-1snzjmgvt0pdlxbl3kgizhzer288ug4ef39cmt4khhzs
qoewi4-ca5x4qmic05i0jblhjs9jrz19 10.200.67.161:2377
```

List the nodes of the cluster, the new node should be listed:

#### Example

```
docker node ls
ID                                HOSTNAME                                STATUS
AVAILABILITY                      MANAGER STATUS                      ENGINE VERSION
kq55m8dxbnuopwh5akv7tb08y *      v-increl01.sco.alma.cl              Ready
Active                              Leader                               19.03.4
ubns4idp39ulyjr5izkw1undv        v-increl02.sco.alma.cl              Ready
Active                              Reachable                            19.03.4
o6yg1g1f22djqc63gv2mx3cnh        v-increl03.sco.alma.cl              Ready
Active                              Reachable                            19.03.4
```



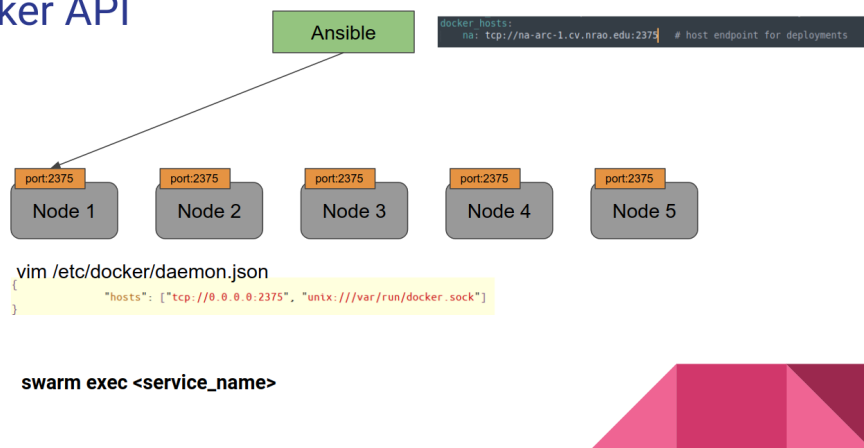
## 1.5 Additional Steps

### 1.5.1 Disable Network Manager

1. `systemctl stop NetworkManager.service`
2. `vim /etc/sysconfig/network-scripts/ifcfg-eth0`
3. add the following parameters `NM_CONTROLLED="no"` and `ONBOOT="yes"` (if doesn't exist)
4. Restart network service.  
`systemctl enable network.service`  
`systemctl start network.service`

### 1.5.2 Disable Docker API

#### Docker API



1. Enable passwordless SSH logins for `<root>` user to each of your cluster nodes and between your clusters.
  - a. Instructions: [http://www.linuxproblem.org/art\\_9.html](http://www.linuxproblem.org/art_9.html) or <https://linuxize.com/post/how-to-setup-passwordless-ssh-login/>
2. Change `docker_hosts` location variable under "global" settings in `<arc>/production/group_vars/all.yml` to ssh communication instead of tcp.
  - a. `na: ssh://root@na-arc-1.cv.nrao.edu` (old was: `tcp://na-arc-1.cv.nrao.edu:2375`)
3. Disable Docker API
  - a. Remove file: `/etc/systemd/system/docker.service.d/override.conf`
  - b. Remove file: `/etc/docker/daemon.json`
4. Reload daemons configuration: `systemctl daemon-reload`
5. Restart docker: `systemctl restart docker`
6. Replace current `swarm.sh` client with this new version `/docker-files/common/swarm/swarm_with_ssh.sh`

Version	Published	Changed By	Comment
<b>CURRENT<sup>2</sup> (v. 29)</b>	<b>May 04, 2021 11:40</b>	<b>Martin Tourneboeuf<sup>3</sup></b>	
v. 28 <sup>4</sup>	May 04, 2021 11:37	Martin Tourneboeuf <sup>5</sup>	
v. 27 <sup>6</sup>	Apr 29, 2021 21:24	Soledad Fuica <sup>7</sup>	
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v. 25 <sup>10</sup>	Apr 29, 2021 21:21	Soledad Fuica <sup>11</sup>	
v. 24 <sup>12</sup>	Apr 29, 2021 21:19	Soledad Fuica <sup>13</sup>	
v. 23 <sup>14</sup>	Apr 29, 2021 21:10	Soledad Fuica <sup>15</sup>	
v. 22 <sup>16</sup>	Apr 29, 2021 21:06	Soledad Fuica <sup>17</sup>	
v. 21 <sup>18</sup>	Apr 29, 2021 21:04	Soledad Fuica <sup>19</sup>	
v. 20 <sup>20</sup>	Apr 29, 2021 20:59	Soledad Fuica <sup>21</sup>	
v. 19 <sup>22</sup>	Apr 29, 2021 20:37	Soledad Fuica <sup>23</sup>	
v. 18 <sup>24</sup>	Apr 29, 2021 20:34	Soledad Fuica <sup>25</sup>	

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<a href="#">v. 15<sup>30</sup></a>	Apr 29, 2021 20:29	<a href="#">Soledad Fuica<sup>31</sup></a>	
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<a href="#">v. 13<sup>34</sup></a>	Jun 02, 2020 17:44	<a href="#">Alvaro Aguirre<sup>35</sup></a>	
<a href="#">v. 12<sup>36</sup></a>	Jun 02, 2020 17:42	<a href="#">Alvaro Aguirre<sup>37</sup></a>	
<a href="#">v. 11<sup>38</sup></a>	Jun 02, 2020 17:30	<a href="#">Alvaro Aguirre<sup>39</sup></a>	
<a href="#">v. 10<sup>40</sup></a>	Apr 14, 2020 18:16	<a href="#">Alvaro Aguirre<sup>41</sup></a>	
<a href="#">v. 9<sup>42</sup></a>	Jan 02, 2020 12:38	<a href="#">Alvaro Aguirre<sup>43</sup></a>	
<a href="#">v. 8<sup>44</sup></a>	Dec 18, 2019 01:27	<a href="#">Alvaro Aguirre<sup>45</sup></a>	
<a href="#">v. 7<sup>46</sup></a>	Dec 15, 2019 20:31	<a href="#">Alvaro Aguirre<sup>47</sup></a>	
<a href="#">v. 6<sup>48</sup></a>	Dec 15, 2019 20:29	<a href="#">Alvaro Aguirre<sup>49</sup></a>	

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v. 1 <sup>58</sup>	Dec 11, 2019 15:52	Alvaro Aguirre <sup>59</sup>	

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